CLAIMS

1   1.   A process for multivariate data analysis comprising the steps of:

2   using a computer in conjunction with a Gram-Schmidt

3   orthogonalization process to determine normal Gram-Schmidt vectors

4   corresponding to observable normal values of a plurality of normal datum

5   where at least one of said plurality of normal datum has zero standard

6   deviation;

7   computing abnormal Gram-Schmidt vectors corresponding to

8   observable abnormal values of a plurality of abnormal datum;

9   computing a signal to noise ratio for said normal Gram-Schmidt vectors

10   and said abnormal Gram-Schmidt vectors to obtain abnormal predicted values;

11   and

12   using said abnormal predicted values for a future prediction.

1   2.   The process of claim 1 further comprising the step of:

2   computing dynamic signal to noise ratios for said normal Gram-

3   Schmidt vectors and for said abnormal Gram-Schmidt vectors.

1   3.   The process of claim 2 wherein said dynamic signal to noise

2   ratio, η_j is equivalent to:

3                        $$\beta_j^{\,2}/V_e \hspace{4cm} (13)$$

4   where $\beta_j = [\sum_{i=1}^{t} M_i\, U_{ij}] / r$, M_i is the ith value of said plurality of abnormal

5   datum, U_{ij} is selected from the group consisting of: said normal Gram-Schmidt

6   vectors and said abnormal Gram-Schmidt vectors, V_e is

7
$$\left(\sum_{i=1}^{t} U_{ij}^{2} - (1/r)\left[\sum_{i=1}^{t} M_i U_{ij} \right]^{2} \right) \Big/ (t-1)$$

8   where i is an integer between 1 and t, and j is an integer between 1 and k.

1   4.   The process of claim 1 further comprising the step of:

2   comparing said abnormal predicted values to said observable abnormal values

3   of said plurality of abnormal datum.

1   5.   The process of claim 1 wherein said observable abnormal values

2   are assigned.

1   6.   The process of claim 1 wherein said observations on k variables

2   relates to medical diagnosis.

1   7.   The process of claim 1 wherein said observations on k variables

2   relates to quality of a manufactured product.

1   8.   The process of claim 1 wherein said observations on k variables

2   relates to financial markets.

1   9.   The process of claim 1 wherein said observations on k variables

2   relates to voice recognition.

1   10.   The process of claim 1 wherein said observations on k variables

2   relates to TV picture recognition.

1   11.   A process for multivariate analysis comprising the steps of:

2   using a computer to calculate Gram-Schmidt orthogonal vectors

3   satisfying the equation:

4    $$U_1 = (u_{11}, u_{12}, .., u_{1n})$$
5    $$U_2 = (u_{21}, u_{22}, .., u_{2n})$$
6    $$\cdot$$
7    $$U_k = (u_{k1}, u_{k2}, .., u_{kn})$$

8   for a sample size n and observations on k variables, wherein the mean of said

9   Gram-Schmidt orthogonal vectors is zero;

10   calculating for each of said Gram-Schmidt vectors has a standard

11   deviation; and

12   calculating a Mahalanobis distance corresponding to each of the k

13   observations that satisfies the equation:

14    $$MD_j = (1/k)\,[(u_{1j}^2/s_1^2) + (u_{2j}^2/s_2^2) + .. + (u_{kj}^2/s_k^2)]$$

15   where j is an integer from 1...n.

1   12.   The process of claim 11 further comprising creating a

2   Mahalanobis space database comprising Gram-Schmidt vector means, Gram-

3   Schmidt standard deviations, Gram-Schmidt coefficients, and Mahalanobis

4   distances corresponding to the k observations.

1   13.   The process of claim 11 wherein said observations on k

2   variables relates to medical diagnosis.

1   14.   The process of claim 11 wherein said observations on k

2   variables relates to quality of a manufactured product.

1   15.   The process of claim 11 wherein said observations on k

2   variables relates to financial markets.

1   16.   The process of claim 11 wherein said observations on k

2   variables relates to voice recognition.

1   17.   The process of claim 11 wherein said observations on k

2   variables relates to TV picture recognition.